



# Shoreline Erosion Control

DDES Customer  
Information Bulletin #

**16**

## • FREQUENTLY ASKED QUESTIONS •

**Visit the DDES Web site at  
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for more information**

King County DDES has created customer information bulletins to inform the general public about the effect of codes and regulations on their projects. These bulletins are not intended to be complete statements of all laws and rules and should not be used as substitutes for them. If conflicts and questions arise, current codes and regulations are final authority. Because the codes and regulations may be revised or amended at any time, consult King County staff to be sure you understand all requirements before beginning work. It is the applicant's responsibility to ensure that the project meets all requirements of applicable codes and regulations.

Alternative formats available upon request

## Shoreline Erosion Control Along Puget Sound, Lake Washington and Lake Sammamish

The purpose of this bulletin is as follows:

- To provide information assisting property owners in assessing beach and bluff erosion problems; and
- To outline permit requirements and regulations for construction of shoreline erosion control structures, such as bulkheads.

After reading this bulletin, customers may wish to discuss specific requirements for permits with staff at the King County Department of Development and Environmental Services (DDES). Landowners and customers may also wish to contact an independent geotechnical consultant to address the problem of shoreline erosion.

### Introduction

Shoreline erosion on Puget Sound, Lake Washington and Lake Sammamish is a problem encountered by many owners of waterfront property. In King County, shorelines are characterized by relatively narrow beaches adjacent to steep bluffs rising from a few feet to over a hundred feet above water. The term "shoreline erosion" commonly includes erosion by waves and currents, which results in the loss of material from beaches and bluffs.

In King County, most material eroded from beaches and bluffs consists of till (sand, gravel, clay and/or boulders) deposited by glaciers which last visited Western Washington about 13,000 years ago. The particle size and soil cohesion and compaction of this material affect how easily it is eroded.

When fine grain particles such as silts and clays are eroded, they are held in suspension by the moving water and swept away. Sand is transported along the beach in the direction of prevailing winds, waves, and currents. This helps maintain a sandy beach and builds accretion deposits such as spits and bars. Pebbles, cobbles (fist-size rocks), and boulders too large to be

moved by the waves and currents remain on the beach, forming a “lag deposit” that is highly resistant to erosion.

The changing tides and winds affect wave erosion in that the water level moves up and down, subjecting parts of the beach to wave action at different times during the tidal cycle. A wide, well-maintained sand or gravel beach is good protection against wave erosion because wave energy is dissipated on the beach before it reaches the bluffs behind and because the upper part of the beach is subjected to wave action only during high tidal elevations and storm conditions.

King County has developed regulations to control shoreline erosion. [See the Critical Areas Chapter of Title 21A, Chapter 21A.24 and Title 25 (“Shoreline Management”) of the King County Code (KCC).] The entire King County Code is accessible via the DDES Web site at [www.metrokc.gov/ddes](http://www.metrokc.gov/ddes).

### Assessing the Problem

To determine the nature of a specific shoreline erosion problem, a geotechnical evaluation will be required. The following questions and concerns will be addressed:

1. Determine what is eroding: the beach, the bluff, or both. Look at the surface drainage: Are open drainpipes, sewers, streams, or lawn and garden watering causing surface run-off problems?
2. Estimate how far back horizontally a structure (or the closest building) is from the High Water Line. What is the vertical elevation between the structure and high water?

Approximate the rate of erosion. (A customer or landowner can keep track of the rate by periodically measuring the distance from a fixed object [corner of a building, for example] to the top of the bluff.)

The distance from the eroding beach or bluff to a structure and the rate of erosion are important in assessing the immediacy of the problem. Evaluate the problem proactively, before the erosion endangers the house.

3. Determine whether the erosion is more or less continuous and at a constant rate, or sudden and severe (such as during a bad storm).

Continuous beach erosion is different from a case in which beach erosion occurred all at once during a severe storm. In some cases, beaches “heal” themselves after a bad storm; the sand may return in a few months, building the beach back to its former shape.

4. Define the character of the beach surface. For example, does it consist of sand, gravel, or hardpan beaches? If the beach is sandy, determine the thickness of the sand layer. To measure this, drive a slender steel rod, such as a piece of concrete reinforcing bar, into the beach at several points. The rod should push easily through loose sand and gravel, but stop at a layer of hardpan or cobbles. The kind of material comprising the beach determines how easily the beach can be eroded, but hardpan or cobbles are extremely difficult to erode. A hardpan beach with a thin sand layer on top may have the sand eroded away, but in many cases the hardpan beneath won't be eroded significantly.
5. Define the composition of the bluff. For example, does it consist of sand or clay or other components of till? One or more of these may be present in layers visible where vegetation is absent from the bluff. The material or materials comprising the bluffs help determine how easily this material can be eroded. Sand in a bluff, exposed at the water

line, can be easily eroded. A clay layer, especially when combined with excess ground water, can cause potential landslide problems that require special engineering consideration.

6. Determine the type of vegetation present on the beach and the bluff (trees, brush, vines, seaweed, beach grass, etc.). Are there any bare landslide areas on the property or nearby? Vegetation is a stabilizing influence on beaches and bluffs. Large, mature trees indicate that a slope has not moved much recently. The absence of vegetation may mean that erosion or movement has occurred recently.
7. Look at the surface drainage. Are open drainpipes, sewers, streams, or lawn and garden watering causing surface run-off problems? Has surface water run-off eroded gullies in the top or face of the bluff? Think about ground water inside the bluff. Surface water can become ground water, causing problems within the bluff. Is there any water at the top or bottom of the bluff? Is water seepage visible on an exposed bluff face (sometimes at the boundary between clay and sand, where the sand is on top of the clay)? Surface and ground water commonly cause problems in bluffs which a bulkhead alone often cannot alleviate.
8. Determine whether there is any direct evidence of ongoing erosion, such as cracks or fissures in the slope, piles of debris (rocks, sand, gravel, etc.) at the base of a bluff, leaning trees or exposed roots, cracked foundations, retaining walls or pavement, or wave-cut notches at the base of the bluff. Such evidence of on-going erosion can help determine the nature and immediacy of the problem.

### Be a Bluff Watcher

Erosion of slopes is a serious problem, resulting in property damage and, potentially, a loss of life. Because of the serious consequences of shoreline erosion and landslides, owners of waterfront property should develop a habit of watching and maintaining their beaches and bluffs.

In much the same way as homeowners think about fire safety by taking care of hazards before they become a problem, owners of waterfront property can do certain things to reduce the likelihood of shoreline erosion and landslides, including the following:

- Maintain catch basins and surface drainage systems in good working condition;
- Don't let drainpipes or surface run-off spill down the unprotected face of a bluff;
- Use tight-line pipe for drainage to keep water from seeping into the ground through leaky pipe joints;
- Protect slope stability. Do not disturb existing vegetation on slopes. Disturbing vegetation on slopes is prohibited by the Critical Areas Code; and
- Avoid excavations and fills near bluffs and on steep slopes. This can lead to erosion or landslide problems.

If slope stability is a problem, a landowner may be required to contact an independent geotechnical consultant. If customers have general questions about obtaining a clearing or grading permit, please call 206-296-6600. For questions concerning critical areas and other technical matters concerning clearing and grading, customers may also call 206-296-6759.

### Erosion Control Structures

Chapter 25.16.180 of the King County Code (KCC) provides shoreline regulation concerning bulkheads. Before building a shoreline erosion control structure such as a bulkhead, customers are required to obtain a professional geotechnical assessment about the causes of the problem from a licensed Engineer or Geologist. A Geotechnical Engineering Report will be required to demonstrate the need and usefulness of the bulkhead.

Be advised that bulkheads are expensive to build and do not always solve the problem. A professional engineering assessment is essential for effective shoreline protection. The assessment will also save time and money, by identifying the specific problem and recommending appropriate solutions.

### Side Effects of Bulkheads

A properly designed and constructed bulkhead may help control a shoreline erosion problem, but it can have some undesirable effects. On Puget Sound, most of the sand making up local beaches comes from the gradual erosion of nearby bluffs. Bulkheads alter or restrict the natural supply of sand to the beaches. As a result, bulkheads can create other erosion problems for neighboring landowners by blocking natural sand supplies to a beach. Consider non-structural alternatives to a bulkhead that will not block sand supplies. Again, the services of a licensed professional Engineer are required in choosing nonstructural methods for reducing or controlling an erosion problem.

### Required Permits

Listed below are examples of some of the permits that may be required, should an applicant decide to proceed to build a bulkhead:

- Shoreline Exemption;
- Shoreline Substantial Development Permit;
- Building Permit;
- U.S. Army Corps of Engineers Section 10 Permit;
- A Department of Fish and Wildlife HPA Permit; and/or
- A Department of Natural Resources (DNR) Use Authorization.

Application for the Building and Shoreline Permits may be made at the Department of Development and Environmental Services (206-296-6600). The U.S. Army Corps of Engineers Permit may be obtained from the Corps' Seattle District Office, 4735 E. Marginal Way S., Seattle, WA (206-764-3495).

### Restrictions on Bulkheads

Bulkheads are not an outright permitted use in King County. Restrictions on bulkheads in King County include the following:

- A bulkhead is normally permitted only when necessary to protect legally established structures and public improvements, or to preserve important agricultural lands as determined by King County Department of Development and Environmental Services.
- The elevation of the toe of a bulkhead must be at or above the elevation of Mean Higher High Water in Puget Sound or Ordinary High Water in Lake Washington except when necessary to tie in with adjacent, legally constructed bulkheads or to replace an existing bulkhead installed no farther offshore than the original. On Lake Sammamish, bulkheads are only permitted above the 100-year Flood Plain [32.5 MSL (Mean Sea Level)].
- Construction of a bulkhead for the purpose of creating landfill is prohibited.

## Restrictions on Bulkheads (Continued)

- Bioengineering methods, such as planting trees and shrubs, are preferred over structural solutions, such as using rocks, pilings and concrete.

For more detailed information, call a King County DDES Shorelines Planner at 206-296-7119.

## Penalties and Liabilities

It is important to obtain the necessary permits before beginning construction of a bulkhead or other shoreline erosion control structure. As part of their mandate to oversee construction in navigable waters, the U.S. Army Corps of Engineers periodically conducts aerial photographic surveys to check compliance with their regulations. Illegally constructed or otherwise non-conforming structures are spotted and appropriate action is taken.

Anyone found in violation of the King County Code may be subject to a fine and/or King County jail sentence. In addition, civil suits may be filed holding a violator responsible for any damages caused by such violation, even to the extent of restoring all affected areas to their previous natural state.

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## Other Bulletins and Telephone Numbers That May Be Helpful

Bulletin 1	Building and Development Permit Telephone Numbers
Bulletin 6	Working With Contractors
Bulletin 9	Obtaining a Residential Building Permit
Bulletin 10	Residential Building On or Near Waterfront: Additional Requirements
Bulletin 12	The Residential Building Permit Process
Bulletin 17A	Zoning Code: Overview and Summary
Bulletin 21	Critical Areas Review
Bulletin 26	The SEPA Process
Bulletin 28	Clearing and Grading Permits

These and other DDES bulletins are available via the department Web site at [www.metrokc.gov/ddes](http://www.metrokc.gov/ddes).

206-296-6600	DDES Permit Center
206-296-6759	DDES Clearing and Grading Permits/Critical Areas
206-296-7119	DDES Shorelines Planner
206-764-3495	U.S. Army Corps of Engineers District Office

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King County complies with the Americans with Disabilities Act (ADA). If you require an accommodation to attend a meeting (two weeks' notice) or require this information in Braille, audiocassette, or large print, please call 206-296-6600 or TTY 206-296-7217.

